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Physics Grade 12 — Chapter 4

Diffraction and Interference

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Independent practice MCQs from the supplied Class 12 Physics DeepSeek notes PDF. Total: 38 questions.

A. Important / Main Topics

1. Interference occurs when:

(A) Two or more waves overlap and superimpose
(B) One wave travels through a medium
(C) A wave is absorbed by a medium
(D) A wave reflects off a surface

Correct Answer: A

Explanation: Interference occurs when Two or more waves overlap and superimpose.

2. Constructive interference occurs when:

(A) Crest meets trough
(B) Crest meets crest
(C) Waves cancel each other
(D) Waves travel in opposite directions

Correct Answer: B

Explanation: Constructive interference occurs when Crest meets crest.

3. Destructive interference occurs when:

(A) Crest meets crest
(B) Trough meets trough
(C) Crest meets trough
(D) Waves travel in the same direction

Correct Answer: C

Explanation: Destructive interference occurs when Crest meets trough.

4. Coherent sources have: 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1355/1830

(A) Different frequencies and random phases
(B) Same amplitude but different frequencies
(C) Different wavelengths and random phases
(D) Same frequency and constant phase relationship

Correct Answer: D

Explanation: Coherent sources emit waves with the same frequency and a constant phase relationship.

5. Interference can be demonstrated with:

(A) Water waves, sound waves, light waves, and microwaves
(B) Water waves only
(C) Sound waves only
(D) Light waves only

Correct Answer: A

Explanation: Interference is a property of all waves.

6. Young's double-slit experiment demonstrates:

(A) The particle nature of light
(B) The wave nature of light
(C) The photoelectric effect
(D) The Compton effect

Correct Answer: B

Explanation: Young's double-slit experiment demonstrates The wave nature of light.

7. In a double-slit experiment, bright fringes are due to:

(A) Destructive interference

(B) Diffraction only

(C) Constructive interference 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1356/1830

(D) Refraction

Correct Answer: C

Explanation: Bright fringes result from constructive interference.

8. In a double-slit experiment, dark fringes are due to:

(A) Constructive interference

(B) Diffraction only

(C) Refraction

(D) Destructive interference

Correct Answer: D

Explanation: Dark fringes result from destructive interference.

9. A diffraction grating consists of:

(A) A large number of equally spaced parallel slits

(B) A single slit

(C) A double slit

(D) A random arrangement of slits

Correct Answer: A

Explanation: A diffraction grating consists of A large number of equally spaced parallel slits.

10. The distance between two adjacent slits in a grating is called:

(A) Slit width

(B) Grating element

(C) Wavelength

(D) Fringe spacing

Correct Answer: B

Explanation: The distance between adjacent slits is the grating element.

11. The condition for observing interference fringes includes:

(A) Coherent sources

(B) Narrow slits

(C) All of the above

(D) Monochromatic waves and a stable environment

Correct Answer: C

Explanation: The condition for observing interference fringes includes All of the above.

12. dcosθ=mλ dsinθ=mλ dtanθ=mλ d/sinθ=mλ dsinθ=mλ dsinθ=mλ d 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1359/1830 Monochromatic waves have:

(A) Multiple wavelengths

(B) No wavelength

(C) Infinite wavelength

(D) A single wavelength

Correct Answer: D

Explanation: Monochromatic means single wavelength.

13. A stable environment is necessary for interference because:

(A) Vibrations and air currents can disrupt the pattern

(B) It increases the wavelength
(C) It changes the frequency
(D) It makes the waves coherent

Correct Answer: A

Explanation: Disturbances can disrupt the interference pattern.

14. Constructive interference produces:

(A) Darkness
(B) Brighter light or louder sound
(C) Quieter sound
(D) No wave

Correct Answer: B

Explanation: Constructive interference produces Brighter light or louder sound.

15. Destructive interference produces:

(A) Brighter light
(B) Louder sound
(C) Darkness or quieter sound 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1360/1830
(D) Larger amplitude

Correct Answer: C

Explanation: Destructive interference produces Darkness or quieter sound 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1360/1830.

16. The phenomenon of interference is a direct consequence of:

(A) The particle nature of waves
(B) The Doppler effect
(C) The photoelectric effect
(D) The superposition principle

Correct Answer: D

Explanation: Interference arises from the superposition of waves.

17. Colorful bands in soap bubbles are due to:

(A) Interference
(B) Reflection only
(C) Refraction only
(D) Diffraction only

Correct Answer: A

Explanation: Colorful bands in soap bubbles are due to Interference.

18. The beating sound between slightly off-tune instruments is due to:

(A) Reflection
(B) Interference
(C) Refraction
(D) Diffraction

Correct Answer: B

Explanation: The beating sound between slightly off-tune instruments is due to Interference.

19. In a ripple tank, the two sources must be:

(A) Incoherent
(B) Of different frequencies
(C) Coherent
(D) Of different wavelengths

Correct Answer: C

Explanation: In a ripple tank, the two sources must be Coherent.

B. Less Important / Secondary Topics

20. Constructive interference in water waves produces:

(A) Larger amplitude
(B) Smaller amplitude
(C) No wave
(D) A stationary wave

Correct Answer: A

Explanation: Constructive interference in water waves produces Larger amplitude.

21. The pattern observed on the water surface in a ripple tank consists of:

(A) Uniform waves
(B) Alternating crests and troughs
(C) Only crests
(D) Only troughs

Correct Answer: B

Explanation: The pattern observed on the water surface in a ripple tank consists of Alternating crests and troughs.

22. In an electromagnetic wave, the electric and magnetic fields are:

(A) Parallel to each other
(B) Parallel to the direction of propagation
(C) Perpendicular to each other and to the direction of propagation
(D) At to each other

Correct Answer: C

Explanation: E and B are perpendicular to each other and to the direction of propagation.

23. Which of the following is NOT an electromagnetic wave?

(A) Radio waves
(B) X-rays E+B E×B E□B E−B E×B E×B 3×10 m s6 −1 3×10 m s8 −1 3×10 m s10 −1 3×10 m s5 −1 3×10 m s8 −1 c≈3×10 m s8 −1 45□ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1363/1830
(C) Gamma rays
(D) Sound waves

Correct Answer: D

Explanation: Sound waves are mechanical waves, not electromagnetic.

24. The visible range of the electromagnetic spectrum is approximately:

(A) 750 nm to 390 nm
(B) 390 nm to 750 nm
(C) 1000 nm to 500 nm
(D) 10 nm to 1 nm

Correct Answer: A

Explanation: Visible light is approximately 750 nm (red) to 390 nm (violet).

25. The electromagnetic spectrum spans from:

(A) Very short radio waves to very long gamma rays
(B) Very long radio waves to very short gamma rays
(C) Only visible light
(D) Only X-rays and gamma rays

Correct Answer: B

Explanation: The spectrum spans from long radio waves to short gamma rays.

26. The electromagnetic wave theory was proposed by:

(A) Newton
(B) Einstein
(C) Maxwell

(D) Bohr

Correct Answer: C

Explanation: The electromagnetic wave theory was proposed by Maxwell.

27. Electromagnetic waves are:

(A) Longitudinal waves
(B) Both longitudinal and transverse
(C) Neither
(D) Transverse waves

Correct Answer: D

Explanation: Electromagnetic waves are transverse waves.

28. If the distance between the slits and screen is doubled in a double-slit experiment, the fringe spacing:

(A) Doubles
(B) Halves
(C) Quadruples
(D) Remains the same

Correct Answer: A

Explanation: , so doubling doubles the fringe spacing.

29. If the slit separation in a double-slit experiment is doubled, the fringe spacing:

(A) Doubles
(B) Halves
(C) Quadruples
(D) Remains the same

Correct Answer: B

Explanation: , so doubling halves the fringe spacing.

30. In Young's experiment, the light is made partially coherent by:

(A) Using a prism
(B) Using a lens
(C) Passing it through a single slit first
(D) Reflecting it from a mirror

Correct Answer: C

Explanation: In Young's experiment, the light is made partially coherent by Passing it through a single slit first.

31. Δy=λL/d L Δy=λL/d d y=λL/d y=0 y=∞ y=d/2 y=0 m=0 y=0 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1366/1830 The fringe spacing between bright and dark fringes is:

(A) Different
(B) Zero
(C) Infinite
(D) The same

Correct Answer: D

Explanation: Δy=λL/d L Δy=λL/d d y=λL/d y=0 y=∞ y=d/2 y=0 m=0 y=0 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1366/1830 The fringe spacing between bright and dark fringes is The same.

32. To observe a clear interference pattern, it is best to use:

(A) Monochromatic light
(B) White light
(C) Sunlight
(D) Candlelight

Correct Answer: A

Explanation: To observe a clear interference pattern, it is best to use Monochromatic light.

33. If the slit separation is increased, the fringe spacing:

(A) Increases
(B) Decreases
(C) Remains the same
(D) Becomes zero

Correct Answer: B

Explanation: , so larger gives smaller fringe spacing.

34. In a diffraction grating, the maxima become narrower and the regions between become darker as the number of slits is increased. This is because:

(A) More slits increase the wavelength
(B) More slits decrease the frequency
(C) More slits produce more destructive interference at off-peak angles
(D) More slits reduce the intensity 2λ 3λ λ/2 m=0 (0+)λ=21 λ/2 m y=mλL/d y=(m+)λL/d21 y=dλL/m y=mdL/λ y=mλL/d y=mλL/d m y=mλL/d y=(m+)λL/d21 y=dλL/m y=mdL/λ y=(m+)λL/d21 y=(m+)λL/d21 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1368/1830

Correct Answer: C

Explanation: With more slits, constructive interference is more precise, producing sharper maxima.

35. The grating element is typically of the order of:

(A) 1 metre
(B) 1 centimetre
(C) 1 kilometre
(D) The wavelength of light or smaller

Correct Answer: D

Explanation: The grating element is typically of the order of The wavelength of light or smaller.

36. If the grating element is decreased, the angle of diffraction for a given order :

(A) Increases
(B) Decreases
(C) Remains the same
(D) Becomes zero

Correct Answer: A

Explanation: , so smaller gives larger , hence larger.

37. Which of the following is NOT a condition for observing interference fringes?

(A) Coherent sources
(B) High pressure
(C) Narrow slits
(D) Monochromatic waves

Correct Answer: B

Explanation: High pressure is not a condition for interference. d d d m dsinθ=mλ d sinθ θ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1369/1830.

38. The interference pattern of microwaves demonstrates:

(A) The particle nature of microwaves
(B) The mass of microwaves
(C) The wave nature of microwaves
(D) The charge of microwaves

Correct Answer: C

Explanation: The interference pattern demonstrates the wave nature of microwaves. Answer Summary 1. B 2. B 3. B 4. B 5. D 6. B 7. B 8. A 9. B 10. B 11. B 12. A 13. C 14. B 15. B 16. D 17. B 18. B 19. B 20. B 10/21/26, 10:17 PM

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